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USSR Report

CHEMISTRY

No. 76

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AEROSOLS

UDC 541.182.2./3:542.67

INVESTIGATING FILTRATION OF AEROSOLS BY CERMET FILTERS

Moscow KOLLOIDNYY ZHURNAL in Russian Vol 43, No 2, Mar-Apr 81 (manuscript received 17 Dec 79) pp 246-250

ZHULANOV, Yu. V. and KRASOVITSKIY, Yu. V., Scientific Research Physico-Chemical Institute imeni L. Ya. Karpov, Moscow, and the Voronezh Technological Institute

[Abstract] The filtering characteristics of porous cermet filters were investigated to determine the role of different mechanisms of aerosol particle precipitation in the filter and to determine the optimum filtration conditions. A laser aerosol counter with integral amplitude analyzer was used to measure the particle concentration before and after the filter in the indicated range of sizes. A Stokes parameter of $3.1 \cdot 10^{-4}$, considerably lower than the theoretically calculated parameter, was found. This lower value is explained by the considerable distortion of the flow field in a real filter compared to that near an isolated sphere. Low filtration efficiency occurs when gases are filtered through cermet filters in the range of the diffuse precipitation mechanism. Flow rates of 0.15-0.30 m/s are especially unfavorable. Particles 0.15 micron or less in diameter have the highest penetrability for highly efficient ultrathin fiber filtering materials. The optimum modes of filters can be determined by calculating the penetration coefficient from the rate of filtration and particle size. Figures 3; references 5: 4 Russian, 1 Western.
[93-6521]

PLANS, ACHIEVEMENTS OF MINERAL FERTILIZER PRODUCTION REVIEWED

Moscow EKONOMICHESKAYA GAZETA in Russian No 17, Apr 81 pp 1-2

[Article: "Development of Mineral Fertilizer Industry. A Review"]

> [Text] Approved by the 26th CPSU Congress, the "Basic Directions of the USSR's Economic and Social Development in 1981-1985 and in the Period to 1990" foresee successive implementation of measures to improve deliveries of chemicals to agriculture, and to achieve more-sensible use of resources associated with the chemicalization of farming and animal husbandry. Mineral fertilizer production will be increased in the Soviet Union in 1985 to 150-155 million tons. This is 46-51 million tons more than the amount produced in 1980.
>
> The proportion of concentrated and mixed mineral fertilizers within the total volume of fertilizer production is to be increased to 90 percent by the end of the five-year plan, while the average nutrient concentration is to be increased to 42 percent, in comparison with 38 percent in 1980.
>
> The state is allocating 14 billion rubles of capital investments to development of mineral fertilizer production in the 11th Five-Year Plan--almost 2 billion rubles more than in the 10th Five-Year Plan.

As a result of successive implementation of our party's agrarian policy, mineral fertilizer industry has transformed into a high-capacity industrial sector. Its production volume doubled in the last 10 years. It was back in the Ninth Five-Year Plan that the Soviet Union reached first place in the world in mineral fertilizer production. In 1980 it produced 104 million tons of fertilizers (in arbitrary units of comparison).

Capital investments into the sector's development attained 12.8 billion rubles in the 10th Five-Year Plan. New large plants went into operation--the Pridonskoy and Meleuz chemical plants, the Novodzhambul Phosphorus Plant, the Chetvertyy Soligorsk Potassium Plant, the Odessa and Ventspils portside plants, and the first generation of the Tol'yatti-Odessa ammonium pipeline, with distribution stations supplying liquid ammonium to kolkhozes and sovkhozes. The output capacities of many operating plants have been increased through new construction and reconstruction of shops and machine units.

Improvements were achieved in the distribution of mineral fertilizer production over the country's territory. They are now being produced in 13 union republics.

Production Volume (Thousands of Tons, in Arbitrary Units of Comparison) in 1980	
Russian Federation	50,013
Ukraine	19,741
Belorussia	13,822
Kazakhstan	6,549
Uzbekistan	6,511
Lithuania	3,106
Estonia	1,366
Azerbaijan	1,135
Tajikistan	390
Armenia	385
Turkmenia	384
Georgia	369
Latvia	102

The greatest growth during the 10th Five-Year Plan was associated with phosphorus fertilizer production--32 percent, and nitrogen fertilizer production--20 percent.

The quality of mineral fertilizers was improved. The proportion of concentrated and mixed fertilizers within the total volume of mineral fertilizers increased from 74 percent in 1975 to 80 percent in 1980. The average concentration of nutrients in mineral fertilizers was raised from 35.8 to 38.1 percent.

In the last five-year plan the kolkhozes and sovkhozes received more than 403 million tons of mineral fertilizers, to include feeds for animal husbandry. The average amount of fertilizer applied to each hectare of land (corrected for 100 percent nutrients) increased from 77.5 kg in 1975 to 88 kg in 1980.

But not all of the planned targets of mineral fertilizer industry were reached. The main reasons for this were delays, in a number of cases, in assimilation of newly created output capacities, and inadequate supply of phosphorus-containing raw materials, sulfur, and iron pyrite to the enterprises. Failure to fulfill capital construction plans created some bottlenecks. Imperfections in the planning and control of the enterprises by the former Ministry of Chemical Industry also had their effect.

The Sector in the Current Five-Year Plan

The 26th CPSU Congress defined the task of intensifying agricultural production as the basis for implementation of its food program. Major steps to hasten chemicalization of agriculture and to increase deliveries of mineral fertilizers, feed additives, and other chemicals to farm laborers have been foreseen for these purposes.

The "Basic Directions of the USSR Economic and Social Development in 1981-1985 and in the Period to 1990" call for increasing mineral fertilizer production to 150-155 million tons in 1985. Mineral fertilizer production must increase by a time and a half in the 11th Five-Year Plan.

Kolkhozes and sovkhozes are to receive more than half a billion tons of mineral fertilizers and chemical feed additives in 1981-1985--100 million tons more than in the 10th Five-Year Plan. This program is going to be hard, but it is realistic. The Ministry of Mineral Fertilizer Production, created for the first time at the end of the past year, is to play an important role in its fulfillment. About 85 percent of all mineral fertilizer is being produced at enterprises subordinated to this ministry. The rest of the amount is supplied by the USSR Ministry of Petroleum Refining and Petrochemical Industry, the USSR Ministry of Nonferrous Metallurgy, the USSR Ministry of Ferrous Metallurgy, and other industrial sectors.

New output capacities annually producing almost 43 million tons of fertilizers, more than 8 million tons of ammonium and about the same quantity of sulfuric acid, and 2 million tons of sulfur are to be placed into operation, and phosphate raw material extraction is to be expanded significantly. Capital investments for the five-year plan will total 14 billion rubles.

In particular, enterprises of the Ministry of Mineral Fertilizer Production plans to build, and place into operation, 13 highly productive ammonium production units with an annual output capacity of 450,000 tons each. Sulfuric acid production is to be increased by introducing machine units characterized by high unit output capacity, and its production out of phosphogypsum at the Gomel' Chemical Plant is to be organized as well.

There are plans for developing ore extraction and acquisition of apatite concentrate in the "Apatit" Association; this is to be done by increasing the output capacities of the concentration factories. Extraction of phosphorite ore is to be increased concurrently with improvement in ore concentration procedures in the "Karatau" Association. The Zabaykal'sk Apatite Plant (at the Oshurkovskoye deposit) is to be placed into operation at the end of the five-year plan.

Sulfur production by enterprises of the Ministry of Mineral Fertilizer Production must be increased by 1.4 times. Accelerated development of the ore base of the "Sera" Production Association (L'vovskaya Oblast) is now acquiring special significance. The Ministry of Gas Industry has been given a significant role in supplying this raw material. It is providing about 30 percent of all sulfur (it is obtained as a gas by-product at the Orenburgskoye and some other deposits). The USSR Ministry of Nonferrous Metallury is called upon to increase production of flotation iron pyrite.

Concurrently with creating new output capacities for the production of mineral fertilizers and developing the raw material base, we need to decisively improve the use of existing production operations. It has now been a long time that the Balakovo, Rustavi, Berezniki, and Dorogobuzh plants and certain production associations--Dzhambul, "Kuybyshevazot", and Rovno--have been falling behind, failing to reach their planned targets. The reserves are not being utilized sufficiently in these production operations.

The sector ministry is called upon to introduce the best experience in organizing labor and production, in intensifying production processes, and in reaching planned technical-economic indicators into these plants. Such experience is available, for example, in certain production associations--"Minudobreniya" in Voskresensk, "Azot" in Nevinnomyssk and Severodonetsk, and a number of others.

The enterprises have received their control figures for 1981-1985. Draft five-year plans for the production of associations and plants are now being written on their basis. It is important to account for and include all possibilities for raising effectiveness and quality, with the broad participation of laborers, engineers, technicians, and white collar workers.

Toward High Quality

Growth in the production of mineral fertilizers during the 11th Five-Year Plan is being accompanied by progressive qualitative changes in the production structure. Production of concentrated and mixed mineral fertilizers is expanding in accordance with the "Basic Directions". Their proportion is to be increased to 90 percent within the total fertilizer volume. The average concentration of nutrients is to be increased to 42 percent.

In keeping with the needs of agriculture, the enterprises of the sector ministry are to produce 44.5 million tons of phosphorus fertilizer in 1985--almost 15 million tons more than in 1980. In this case the increase will be achieved mainly through the production of double superphosphate and mixed forms of mineral fertilizers.

Nitrogen fertilizer production is typified in the current five-year plan by preferential production of highly concentrated single and mixed fertilizers. Our goal is to supply kolkhozes and sovkhozes with nitrogen fertilizers mainly in granulated and noncaking form, suited to unpackaged shipment and dry mixing. There are plans for initiating production of mixed fertilizers by the method of nitric acid breakdown of apatite concentrate.

Agriculture will begin receiving more potassium fertilizers. By the end of the five-year plan the sector will convert to delivery of such fertilizer only in granulated and large-crystal form. For the moment, the "Beloruskaliy" and "Uralkaliy" associations are supplying only a fourth of the required volume.

The Reserves of Economy

The 1981 plan foresees production of 113.8 million tons of mineral fertilizers, with almost a 10 million ton increase over the volume for the past year. If we are to reach this target, we need to insure fuller utilization of production capacities, strict adherence to established production processes, and economical use of materials and power. At the moment, a number of enterprises are overconsuming raw materials: iron pyrite per ton of sulfuric acid, sulfuric acid per ton of phosphorus fertilizers, and ammonium per ton of carbamide.

By complying with the consumption norms and utilizing the experience of the best enterprises, we will be able to produce additional hundreds of thousands of tons of fertilizers out of the raw materials at hand. A good example is offered in this regard by chemists of Voskresensk, Shchekino, and Cherepovets.

Workers of the scientific research institutes are obligated to solve the problems of processing sulfuric acid production wastes (cinders) faster. The latter contain up to 55 percent iron, and a certain amount of rare elements.

In apatite ore processing, not more than a million and a half tons of nepheline concentrate--a valuable raw material in aluminum production--are obtained as a by-product. But about 5 million tons of the wastes are sent to the dumps.

We still do not have an economically justified procedure for processing the wastes of extraction phosphoric acid production (phosphogypsum). Each year the phosphogypsum dumps grow by 10 million tons, in which about a million and a half tons of sulfur--a scarce fertilizer raw material--are lost. Many millions of tons of concentration wastes--halite (rock salt)--have accumulated at the potassium enterprises. All of this makes it necessary to hasten development and introduction of wasteless processes into mineral fertilizer production.

Reequipment of the enterprises, which began in the 10th Five-Year Plan, must be accelerated in the 11th Five-Year Plan. This means utilization of all factors associated with growth in labor productivity. The level of the latter must be raised by 33 percent in 5 years.

The enterprise collectives of the Ministry of Mineral Fertilizer Production successfully completed their plan for the first quarter. They produced 1.2 million tons more mineral fertilizer than in the same period of last year. The kolkhozes and sovkhozes received 619,000 tons more fertilizer than planned.

Laborers of the Kingisepp "Fosforit" Association are in the vanguard of the all-union socialist competition. They produced 10,000 tons more fertilizer than planned in January-March. Collectives of the "Beloruskaliy", the Sumi "Khimprom", and the Grodno "Azot" associations, and of a number of other enterprises, also distinguished themselves in the competition.

But a number of enterprises have still not achieved a rhythmical work pace, lagging behind in the production of ammonium and sulfuric acid. Ammonium production units in the "Kuybyshevazot" Association are not being assimilated satisfactorily. Care for equipment is poorly organized at the Uvarovo and Balakovo chemical plants--their production of sulfuric acid fell short by a significant amount.

All of the sector's reserves for growth in effectiveness and quality must be placed into action.

11004
CSO: 1841/100

SECURING MINERAL FERTILIZERS FOR SIBERIA'S FARMLANDS

Moscow PRAVDA in Russian 22 May 81 p 2

[Article by PRAVDA special correspondent S. Vtorushin, Novosibirsk-Yakutsk-Ulan-Ude: "Fertilizer for Siberia"]

[Text] It was 350 years ago that a Russian husbandman first put plow to Siberian soil. Today Siberia produces annually approximately 30 million tons of grain and large quantities of meat, milk and other agricultural products. And an appropriately vast acreage is under cultivation. Arable land in the eastern regions of the Russian Federation exceeds 30 million hectares -- one fourth of the nation's total. The Siberian farmer, however, must work very hard for his grain harvest. In the 10th Five-Year Plan Siberian yields averaged 11.5 quintals of grain per hectare.

In coming years the farmers of Siberia must sharply boost crop yields. But development of agriculture in Siberia has in the past been primarily extensive rather than intensive. A factor favoring this was the availability of vast areas of unutilized land. Today practically no unutilized land remains. In addition, total arable acreage is slowly but steadily shrinking. Land is being withdrawn from agricultural use for construction of roads, new industrial plants and towns.

In addition, Siberia's soils are becoming impoverished. According to the figures of scientists, removal of nutrients from each hectare of arable land during the period of systematic crop farming totals 15 tons of nitrogen, 5 tons of phosphorus, and 12 tons of potassium. At the beginning of this century the eastern chernozems contained 14-15 percent humus. Today no such soil exists in Siberia. Content of nutrient substances has declined to half, and losses of organic material run from 20 to 50 percent.

Fertility has also declined in the virgin-soil areas. In the initial years of agricultural exploitation humus content comprised 4-5 percent, while today the figure is 2-3 percent. Soils in the steppe zone are young and therefore highly vulnerable. They degrade rapidly. Is it realistic under these conditions to consider increasing agricultural production?

Up to the present time practically no mineral fertilizer has been applied to Siberian soil. Only approximately 20 kilograms per hectare is applied -- 3.5 times less than the RSFSR average. Mineral fertilizers are applied only to corn, vegetables, and industrial crops. Grains are grown exclusively with the benefit of natural accumulation of nutrients in the soil. What can fertilizers give the Siberian farmer?

Ten years ago the Rodina Kolkhoz in Katayskiy Rayon, Kurganskaya Oblast proceeded to apply chemicals to its crop acreage. Each year they apply 90 kilograms of nitrogen and 50-60 kilograms of phosphorus per hectare of cropland. During this period this kolkhoz's grain crop yields have increased from 15 to 35 quintals per hectare, with a figure of 41 quintals last year.

On the Iskitimskiy Sovkhoz in Novosibirskaya Oblast, with a full-dose application of fertilizers, Novosibirskaya-67 wheat yielded 60 quintals on the average. Not from the entire acreage, to be true, but from a test plot. But it is a quite reasonable goal to obtain in Siberia stable yields of 35-40 quintals of grain per hectare, and not in the distant future but within the next few years.

It is a well known fact that Siberia is a zone of high-risk agriculture. One out of every four years is a drought year.

"But with application of 60-120 kg of phosphorus per hectare during the fall plowing of fallow, even in the most difficult summer we obtain 6-12 quintals of grain on the average," stated A. Yuzhakov, deputy director of the Siberian Scientific Research Institute for Agriculture and Employment of Chemicals in Agriculture. "Wherever fertilizer is not applied, the crops fail in bad years."

In the opinion of Siberian scientists, grain yields can be more than doubled even in taiga and semi-taiga zones with the aid of fertilizer application. Perennial grasses and other fodder crops respond immediately to top-dressing application. With adequate supply of mineral fertilizers, farms in the northern zone can sharply boost livestock productivity and produce more meat and milk. According to the calculations of experts, in the southern areas annual grain production can be boosted by more than 50 percent without increasing planted acreage.

Application of mineral fertilizers is not increasing in Siberia, however, although the need is growing. The main reason for this is that there are no enterprises producing fertilizers in Siberia. The Azot Association, located in Kemerovskaya Oblast, ships its entire output to Central Asia. It is used entirely for cotton. Other enterprises have not been built, as there were no raw materials for them to process.

In recent years Siberian geologists have discovered deposits of minerals suitable for producing mineral fertilizers. In Yakutsk I was shown a piece of gray rock covered with small light-colored spots.

"This is apatite ore from the Seligdarskoye deposit," explained M. Kochetov, deputy general director of the Yakutsk Geologiya Association. "We have only made a preliminary survey, but it is already clearly evident that we could have an annual production here of 4-5 million tons of phosphorus pentoxide. The deposit is situated near the town of Aldan. The resolutions of the 26th CPSU Congress specify the need to prepare the technical and economic substantiation for building a rail line here to Yakutsk, so that hauling of ore or apatite concentrate will be simplified."

It is true that the Seligdarskoye ore is difficult to process. The conventional process used in producing apatite concentrate is unsuited to this rock. It would seem that immediately following discovery of the deposit, processors should have commenced extensive research to find new methods of obtaining phosphate fertilizer from rocks of this type. But the deposit has not yet even been surveyed in detail.

The main argument employed by top officials in this industry is the high cost of the concentrate obtained from the Seligdarskoye rock. But nobody has yet made an effort to find economical methods of processing it. The geologists have now commenced this task, but they need the assistance of chemists.

Another large apatite deposit -- Khani -- was recently discovered in Yakutia. It is located right on the route of the Baikal-Amur Mainline. The process of concentrating the ore in this deposit is simple, but the deposit is not yet being surveyed in detail.

A timid step toward utilization of the apatites of Eastern Siberia has been taken in the Buryat ASSR, where the Oshurkovskoye deposit has been discovered. Ore reserves in this deposit total approximately 1 billion tons. An experimental commercial installation is under construction in the vicinity of Ulan-Ude, which will have a daily output capacity of 60 tons of apatite concentrate. Construction is proceeding extremely slowly. Here too one fails to see any particular interest shown in production of a commodity which is so needed by agriculture.

And yet apatite reserves in the Transbaykal are enormous. In addition to the Oshurkovskoye, several other phosphate-containing ores have been discovered in the Buryat ASSR. One of them, the Khubsugul, extends on across the border onto the territory of our friendly neighbor, the Mongolian People's Republic. This deposit is of unquestioned interest not only by virtue of quantity of reserves but also in view of the high quality of the raw material.

"But the largest apatite deposit in the eastern part of our country has been discovered in Krasnoyarskiy Kray, northeast of Noril'sk," I was told by Academician A. Yanshin, deputy director of the Institute of Geology and Geophysics of the Siberian Department of the USSR Academy of Sciences. "Reserves are estimated at several billion tons, and the ore can be easily concentrated and contains a fairly high phosphorus content. Thanks to recent discoveries by geologists, the chemical industry now has a reliable base for producing phosphate fertilizers in Siberia."

In the last two years important progress has been made toward supplying Siberia's agriculture with potash fertilizers. Not far from the point where the Nepa River flows into the Lower Tunguska, geologists have discovered a promising deposit of potassium salts of very high quality. Magnesium content runs into hundredths of a percent, and insoluble sediment -- thousandths of a percent.

"We can now state," Academician A. Yanshin believes, "that our country's largest potash basin has been discovered in the northern part of Irkutskaya Oblast. We must make a detailed survey as quickly as possible and set up the production of mineral fertilizers."

Siberia needs a state program of development of the fertilizer industry. Reserves of raw materials available in this region can satisfy both local needs and those of other parts of the country. The Ministry of Mineral Fertilizer Production should be actively involved in development of such a program. In putting together such a program it is essential to bear in mind that the Siberian farmlands need not only phosphate and potash but also nitrate fertilizers. Western Siberia also contains favorable conditions for producing such fertilizers, as this is an area of intensive growth and development of natural gas production and processing.

The program should include the development of equipment to haul, load and apply fertilizers. We presently lack such equipment. Fertilizer is applied with seeders. This leads to considerable moisture losses in the fields. If the granules could be applied locally during the period of planting grains, it would be possible not only to preserve valuable moisture but also to achieve enormous savings in motor fuel, for the total number of tractor runs would be immediately cut in half.

Siberia's farmlands are vast. Last year a fairly good harvest was produced. But the Siberian land can be much more generous. We must merely help it and keep it from wearing out. Then a 200-pood yield will become commonplace for many parts of Siberia.

3024
CSO: 1841/102

BREAKDOWNS IN FERTILIZER PRODUCTION

Moscow SOTSIALISTICHESKAYA INDUSTRIYA in Russian 10 Jun 81 p 1

[Article by Ye. Leontiyeva: "The Route to High Harvests"]

[Text] Harvests come dearly to both the agricultural workers and to the soil. For each hectare of wheat and rye about 150 kilograms of nutrients are removed each year, while corn, beets and potatoes take 3-4 times more. But there is no alternative: everything which man removes from the soil with a harvest, must be returned.

Sharing the concerns of the grain growers, workers of the Ministry of Mineral Fertilizer Production have successfully fulfilled their plan five months ahead of time, providing over 100,000 tons of fertilizers. Almost half of this above-plan production was done by the three best associations - "Beloruskaliy", Sumy "Khimprom", and Grodno "Azot". Such enterprises as the Voskresensk association "Minudobreniya", the Severodonets and Nevinnomyssk "Azots", the Gomel' Chemical Plant imeni 50th Anniversary of the USSR also worked well.

These achievements are good news because the branch has not been handling these tasks well for a long time. But even now, when the plan is being fulfilled, the agricultural workers still have many claims against the chemical workers. The program for increasing the nutrient content in fertilizers remains unfulfilled. Furthermore, the kolkhozes and sovkhozes are still getting 19 million tons of non-pelletized dusty fertilizers, which require heavy additional expenditures for their off-loading and preparation for the soil. For the same reason, there are still high losses due to caking. All of this, taken together, does not give us cause to rest.

In the current five-year plan the output of fertilizers is supposed to be increased by one third, and their quality is supposed to be increased significantly. The branch has vast potentials at its disposal for the production of fertilizers which permit it to carry out its assigned task. But, unfortunately, this potential is "working" far from well. The production capabilities are being utilized by only 80%. In 1975 their indices of utilization were better. The drop was mainly at enterprises putting out phosphate fertilizers, where increases were most urgent of all.

When it comes to individual enterprises, the most unsatisfactory utilization of facilities belongs to technicians of the Bereznikov nitrogen fertilizer plant, the Dorogobuzh plant for nitrogen fertilizers, the Novgorod "Azot", and the Rustavi Khimzavod. Worst of all were "Soyuzazot", "Soyuzosnovkhim", and "Soyuzfosfor" (managers - V. Panchenkov, A. Aleshin, and T. Al'zhanov). These associations have shops which were built during the last five-year plan but are still not equipped. The ammonia complex in Tol'yatti and the sulfuric acid shop in Balakov serve as examples.

Poor utilization of facilities, including the multi-ton imported equipment, also covers accidental stoppages of aggregates, excessively long repairs, and huge wastes of raw material and energy. Due to improper operation back in March of this year an aggregate in the nitric acid shop in the Rustavi Khimzavod was taken out of commission. The results - prolonged down time and plan disruption in supplying nitrogen fertilizers. The large ammonia aggregate at the Gorkov association "Stirol" was stopped for over a month due to gross technological neglect. An accident recently took place at the Cherepovets association "Ammofos" - here also technological discipline was neglected.

The Balakov Chemical Plant is long outstanding despite frequent attempts by the branch management to put it back in operation. Built on the basis of the new technology, it was over 90 million rubles short in production over the 10th Five-Year Plan. The shops here are in a state of continuous repair, although this is not all.

When technological progress is carried out unevenly and work stoppages at enterprises are looked upon as emergencies, then materials waste becomes law. Last year the Rovenskiy "Azot", over-expended 35,000 tons of sulfuric acid and 30,000 tons of appatite concentrate for the complex fertilizer nitroammofos. Enormous quantities of sulfuric acid are needlessly wasted by the Maarduskiy, Uvarovskiy, Chardzhouskiy chemical plants. Enterprises putting out ammofos, however, operate by norms, exceeding projections by 7-14%.

In short, not being in the framework of acceptable has become a daily occurrence for the mineral fertilizer industry. In recent years, however, serious problems in the raw material base arise more and more frequently. Readily accessible rich ores, before which the mining enterprises first "prostrated" themselves, are rapidly running out. It has become necessary to take seconds or else to work less rich deposits requiring large expenditures. The salts of fertility are becoming more and more expensive.

An especially alarming situation due to shortages of sulfur and iron pyrites is currently developing in the production of phosphate fertilizers. High energy costs for underground melting of sulfur and huge heat losses associated with inefficient extraction of sulfur - such is the picture at the mines in L'vovskiy Oblast and in Turkmenia. Raw material resources also are used poorly here.

Economic indicators are also depressed by errors and miscalculations which are often overlooked in the design and construction of new facilities. Furthermore, the limit of capital investments for industrial consuruction is now being utilized by only 75%. If this is not improved, the programs for supplying fertilizers to the agricultural sector may be threatened.

Taken together, these factors are very tangibly reflected in the affairs of the branch. Small wonder that production costs keep rising: they have increased 10% over the 10th Five-Year Plan! This includes 27.3% for "Soyuzfosfor" and 31.2% for "Soyuzsera".

Now, as our domestic agriculture is entering a qualitatively new stage of intensive chemicalization, and as the transition to higher norms for supplying fertilizers takes place, it becomes apparent that a well-planned restructuring of management in the chemical enterprises is needed. To raise the output of fertilizers to the level of modern needs, our new specialized ministry is faced with an enormous task. It is evident from the successful beginning of the year that this task has begun.

CSO: 1841/102-P

UDC 547.26'118:547.442.3

REACTION OF BETA-DICARBONYL COMPOUNDS WITH DIALKYLSILYLPHOSPHITES AND TRIALKYLPHOSPHITES. SPATIAL STRUCTURE OF PRODUCTS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 18 Sep 80) pp 505-514

OFITSEROVA, E. Kh., IVANOVA, O. Ye., OFITSEROV, Ye. N., KONOVALOVA, I. V., and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The study showed that dialkylsilylphosphites react with acetoacetic ether with formation of alpha-siloxyphonates while the reaction of dimethylsilylphosphite with acetylacetone includes silylation of the acetylacetone enol and interaction of the alpha-siloxyphsophonate with the 2d molecule of silylphosphate leading to formation of oxaphospholane of the splitting off of trimethylmethoxysilylane. Interaction of acetylacetone, hexafluoroacetylacetone, acetoacetic ether with trialkylphosphites produced oxidation of the latter with formation of corresponding trialkylphosphates with intermediate compounds being phosphoranes. The experimental procedure and reactions are discussed in detail. References: 12.
[94-2791]

UDC 542.91+547.1'118

PHOSPHOLANES CONTAINING A HYDRAZONE FRAGMENT IN THE MOLECULE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 19 Jun 80) pp 514-516

PUDOVIK, M. A., GADZHIYEV, G. Yu., DZHALILOV, E. Yu., MEDVEDEVA, M. D. and PUDOVIK, A. N., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov of the Kazan' Branch of the USSR Academy of Sciences

[Abstract] A study of the interaction of beta-hydroxyhydrazones of aldehydes and ketones with the series of hexaalkyltriamino phosphines and diamides of alkylphosphorous acids showed these reactions produced some 3-iminosubstitued 1,3,2-hydroxazophospholanes with a tri-coordinated and tetra-coordinated phosphorus atom. References: 2.
[94-2791]

UDC 546.185

REACTIONS OF 1-TRICHLOROPHOSPHAZO-1, 1-DICHLOROALKANES WITH ACRYLONITRILE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 10 Jul 80) pp 517-518

BOYKO, A. P. and KUKHAR', V. P., Institute of Organic Chemistry of the Ukrainian SSR Academy of Sciences

[Abstract] The study of infra-red spectra recorded with the use of the "Specord IR-71" spectroscope and of nuclear magnetic resonance ^{31}P spectra recorded on a "Tesla BS-487B" showed that 1-trichlorophosphazo-1, 1-dichloroalkanes reacted with acrylonitrile to form diazophosphorines with the reaction involving electrophilic connection by a double carbon-darbon bond. Alpha-chloroacrylonitril connected trichlorophosphasoperchloroethane by a triple bond of the nitrile group. References: 4.
[94-2791]

UDC 542.91+547.1'118

REACTIONS OF OXAZOPHOSPHOLANES WITH CARBOXYLIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 9 Jul 80) pp 518-526

PUDOVIK, M. A., TERENT'YEVA, S. A. and PUDOVIK, A. N., Kazan' Branch of the USSR Academy of Sciences Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] Acidolysis of 2-dialkylamino-1,3,2-oxazophospholanes proceeded with participation of an exocyclic P-N bond. The reactions of 2-alkoxy-1,3,2-oxazophosphalanes with carboxylic acids went in 2 directions: with participation of endocyclic P-N and exocyclic P-O bonds with production of acids of a cyclic and linear structure. Using the example of 2-alkyl-1,3,2-oxazophospholanes, it was shown that the first stage of the reactions with carboxylic acids, leading to formation of acylphosphonites, is reversible. The experimental procedure and reactions are presented and discussed in detail. References: 9.
[94-2791]

UDC 547.341+541.67

INTERACTION OF ARYLAZIDES AND VINYLPHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 10 Jun 80) pp 526-529

KHUSAINOVA, N. G., BREDIKHINA, Z. A., ISHMAYEVA, E. A., MUSINA, A. A. and PUDOVIK, A. N., Kazan' Branch of the USSR Academy of Sciences, Kazan' State University Institute of Organic and Physical Chemistry

[Abstract] A study of the behavior of arylazides in respect to beta-cyanvinylphosphonates, propenylphosphonates and vinylphosphonates showed that reactions of 1,3-dipolar cycloconnection of para-substituted arylazides to vinyl phosphonates leads, upon heating, to formation of phosphonylaziridines with donor substituents in arylazides and formation of enamines with acceptor substituents. A gauche -- structure with a phosphoryl group directed toward nitrogen of the aziriding cycle was established for 1-aryl-2-o,0-diethylphosphonylaziridines. References: 11.
[94-2791]

UDC 542.91+661.718.1

SYNTHESIS, STRUCTURE AND PROPERTIES OF PHOSPHORYLATED DERIVATIVES OF N-DIALKYLDITHIOCARBAMIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 14 Jul 80) pp 530-538

PUDOVIK, M. A., KIBARDINA, L. K., ALEKSANDROVA, I. A., KHAYRULLIN, V. K. and PUDOVIK, A. N., Kazan' Branch of the USSR Academy of Sciences, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] Reactions of different monoamides, diamides and triamides of acids of trivalent phosphorus with carbon disulfide were studied with the use of nuclear magnetic resonance of ^{31}P. It was found that reactions of hexaalkyltriaminophosphines and sulfur dioxide are accompanied by formation of bipolar ions or products of incorporation by P-N bonds, according to conditions of the reaction and are reversible. The role of acid catalysis in reactions of amino-derivatives of trivalent phosphorus and sulfur disulfide was confirmed. The presence in tris (N-diethylthiocarbamoylthic) phosphine of intermolecular coordination of phosphorus with thione atoms of sulfur was found to affect its reaction capacity with proton donor reagents. References: 14.
[94-2791]

UDC 542.91+547.1'118

REACTION OF AMINOLYSIS IN THE 1,3,2-OXAZOPHOSPHOLANES SERIES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 14 Jul 80) pp 538-541

PUDOVIK, M. A., KIBARDINA, L. K. and PUDOVIK, A. N., Kazan' Branch of the
USSR Academy of Sciences, Institute of Organic and Physical Chemistry imeni
A. Ye. Arbuzov

[Abstract] A study of the reamination reaction of 1,3,2-oxazophospholales containing both exocyclic and endocyclic P-N bonds showed aminolysis of 2-diethylamino-3-phenyl-1,3,2-oxazophospholane under the effect of aniline is realized only at high temperatures. Interaction of 2-ethoxy-3-methyl-1,3,2-oxazophospholane with aniline hydrochloride proceeded exothermically with breakdown of the endocyclic P-N bond and with formation of a mixed anilidophosphite. The reaction is reversible. References: 7.
[94-2791]

UDC 547.26'118

INTERACTION OF PENTA (ALPHA, ALPHA, OMEGA-TRIHYDROPOLYFLUORALKOXY)- PHOSPHORANES WITH ARENTHIOLAMES. TETRA (ALPHA, ALPHA, OMEGA-TRIHYDROPOLYFLUORALKOXY)-PHENYLTHIOPHOSPHORANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 20 Jun 80) pp 542-547

SHERMOLOVICH, Yu. G., KOLESNIK, N. P., VASIL'YEV, V. V., PASHINNIK, V. Ye. and
MARKOVSKIY, L. N., UkSSR Academy of Sciences Institute of Organic Chemistry

[Abstract] This continuation of the study of reactions of phosphorane with nucleophils involved the study of the reaction with arenthiols and indicated that penta (alpha, alpha, omega-trihydro-polyfluoralkoxy) phosphoranes alkylate thiophenols with formation of arylpolyfluoroalkylsulfides. The reaction passed through a stage of formation of mixed tetrapolyfluoroalkoxyarylthiophosphorane. References: 14.
[94-2791]

UDC 547.341

RESEARCH IN THE SERIES OF DERIVATIVES OF PHOSPHINIC AND PHOSPHINOUS ACIDS

106. STUDY OF REACTIONS OF INTERACTION OF ENAMINES OF PHOSPHORYLATED KETONES WITH ALPHA, BETA-UNSATURATED CARBONYL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 14 Jul 80) pp 547-552

ALIKIN, A. Yu., SOKOLOV, M. P., LIORBER, B. G., RAZUMOV, A. I., ZYKOVA, T. V.
and ZYKOVA, V. V., Kazan' Chemico-Technological Institute imeni S. M. Kirov

[Abstract] The interaction of enamines of phosphorylated ketones with alpha, beta-unsaturated compounds (methylacrylate, acrylonitril, ethylidenacetoacetic ether and ethyldeneacetylacetone) was studied. The study of the interaction of secondary enamines of phosphorylated ketones with methylacrylate and acrylonitrile showed the process proceeds as a C-alkylation reaction with formation of methyl ethers and nitrils-4-dialkyloxyphosphonil-5-butylamino-4-alkenic acids. The interaction of primary enamines of phosphorylated ketones with ethylideneacetoacetic ether and ethylidene-acetylacetone goes as a C-alkylation reaction with subsequent intramolecular cyclization with formation of phosphorylated 1,4-dihydropyridine. References: 3.
[94-2791]

UDC 547.26'118

INTERACTION OF DIETHYLANYLIDOPHOSPHITE AND DIETHYL ETHER OF N, N'-DIPHENYLAMINOPHOSPHONIC ACID WITH PHENYLISOCYANATE BY THE INFRA-RED SPECTROSCOPY METHOD

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 9 Jul 79) pp 552-555

BAKHITOV, M. I., ZHARKOV, V. V., KUZNETSOV, Ye. V. and KHAZEYEVA, Z. Kh.,
Kazan' Chemico-Technological Institute imeni S. M. Kirov

[Abstract] The method of infra-red spectroscopy showed that diethylanilidophosphite reacts with phenylisocyanate at a ratio of 2:1 with formation of diphenylcarbodimide and diethyl ether of N,N'-diphenylamidinophosphonic acid. It was found that the latter, in dependence upon conditions of the reaction, might react with phenylisocyanate with formation of 1,3-diazocyclo-2,2-diethylphosphanilide-4-butanone. References: 7; Figures: 3.
[94-2791]

UDC 547.341

RESEARCH IN THE SERIES OF DERIVATIVES OF PHOSPHINIC AND PHOSPHINOUS ACIDS. 107. A STUDY OF THE REACTION OF INTERACTION OF PHOSPHORYLATED ENAMINES WITH ACROLEIN AND CROTON ALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 14 Jul 80) pp 556-561

ALIKIN, A. Yu., SOKOLOV, M. P., LIORBER, B. G., RAZUMOV, A. I., ZYKOVA, T. B., ZYKOVA, V. V. and SULEYMANOVA, I. N., Kazan' Chemico-Technological Institute imeni S. M. Kirov

[Abstract] A study of the interaction of phosphorylated enamines with alpha, beta-unsaturated aldehydes, acrolein aldehyde and croton aldehyde showed the reaction in an alcohol medium at low temperature is a C-alkylation type reaction with subsequent intramolecular cyclization with formation of 3-phosphorylated tetrahydropyridines. The phosphorylated tetrahydropyridines, upon heating, were converted into 3-phosphorylated 1,4-dihydropyridines. The interaction of croton aldehyde with phosphorylated secondary enamines proceeded at high temperature and produced 3-phosphorylated 1,4-dihydropyridines. References: 5.
[94-2791]

UDC 546.185

DISPROPORTIONATION OF ACID CHLORIDES OF N,N-SUBSTITUTED DIAMINOPHOSPHOROUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 29 Jun 80) pp 561-566

MARCHENKO, A. P., KOVENYA, V. A., KUDRYAVTSEV, A. A. and PINSHUK, A. M., UkSSR Academy of Sciences Institute of Organic Chemistry

[Abstract] Nuclear magnetic resonance studies showed that diaminochlorophosphites were found in equilibrium with triaminophosphites and amino-dichlorophosphites and this leads to formation of a mixture of compounds during interaction of them with both nucleophilic and electrophilic reagents. The structure and composition of products of reaction of diaminochlorophosphites with nucleophilic and electrophilic reagents are determined by the ratio of the reaction rates of all three components with the agent introduced. References: 14.
[94-2791]

UDC 542.91:547.26'118

HYDROLYSIS AND ACIDOLYSIS OF DIACID CHLORIDES OF PHOSPHONIC AND PHOSPHONOUS ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 11 Jul 79) pp 566-571

ANDREYEV, N. A. and GRISHINA, O. N., Kazan' Branch of the USSR Academy of Sciences, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] Control of the course of incomplete hydrolysis of diacid chloride of cyclohexylphosphonic acid by the nuclear magnetic resonance on nuclei of a ^{31}P atom method showed the interaction proceeds complexly. It was found that incomplete hydrolysis of diacid chloride proceeds through formation of intermediate monochlorophosphonates, phosphonic acids and pyrophosphonic acids derivatives and leads to polyphosphonates. Acidolysis of dichlorophosphonites and dichlorophosphonates with phosphinic and phosphonous acids led through formation of intermediate derivatives of pyrophosphonic and pyrophonous acids to monochlorophosphonites and monochlorophosphonates respectively. The reactions are reversible. References: 19.
[94-2791]

UDC 547.26'118+541.515

HOMOLYTIC REACTIONS OF ORGANOPHOSPHONIC COMPOUNDS

9. THE KINETICS OF INTERACTION OF PHOSPHORYL COMPOUNDS WITH THE TERTIARY-BUTOXYL RADICAL. THE EFFECT OF THE POLARITY OF THE MEDIUM

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 15 Apr 80) pp 571-579

ABUL'KHANOV, A. G., LEVIN, Ya. A. and RYZHKINA, I. S., Kazan' Branch of the USSR Academy of Sciences, Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov

[Abstract] A study of the kinetics of S_h2 substitution in the hydrogen atom in phosphoryl containing organophosphorous compounds by a polar tert-butoxyl radical showed that the effect of the polarity of the medium on the competition of the fragmentation reaction of the tert-butoxyl radical and the separation by it of hydrogen from organic and organophosphorous compounds was described quantitatively by Kirkwood's equation. It was found that the effect of the organophosphorus component of the medium on the rate constant of homological substitution is associated with its effect on the degree of separation of the charge in the transition state. References: 13; Figures: 2.
[94-2791]

UDC 547.821.4

INTERMOLECULAR INTERACTIONS OF ORGANOPHOSPHORUS COMPOUNDS WITH PROTON-DONOR AND PROTON-ACCEPTOR SUBSTANCES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81 (submitted 30 Jul 79) pp 579-584

NOVIKOV, V. F., NURTDINOV, S. Kh. and VIGDERGAUZ, M. S., Kazan' Chemico-Technological Institute imeni S. M. Kirov

[Abstract] A quantitative evaluation of forces of intermolecular interaction was presented and discussed and some thermodynamic characteristics of proton-donor soluble substances in organophosphorus immobile phases were determined. There was found a linear dependence between the heats of solution of benzene and cyclohexane in ethers of cycloalkene-1-ilphosphinic acids and the refractive index. Linear indices of confinement and analogs of factors of polarity of proton-donor sorbates upon dissolution of them in organophosphorus immobile phases were determined. References: 11.
[94-2791]

UDC 547.26'118.07

ACYLATION OF N-DIALKYLPHOSPHORYLUREAS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81 (submitted 17 Apr 80) pp 710-711

NIKONOROV, K. V., GURYLEV, E. A., LATYPOV, Z. Ya. and ANTOKHINA, L. A., Kazan' Branch of the USSR Academy of Sciences, Institute of Organic and Physical Chemistry

[Abstract] Acylation of N-dialkylphosphorylureas was conductdd by the action of carboxylic acid in the presence of a catalytic quantity of concentrated sulfuric acid by the scheme $(RO)_2P(O)NHC(O)NH_2+(R'CO)_2O \xrightarrow{H2SO4} (RO)_2P(O)NHC(O)NHC(O)R'$ and the compounds obtained were described. The N-dialkylphosphoryl-N'-acylourea obtained possesses a weak herbicidal action. References: 4.
[94-2791]

UDC 547.341

NUCLEAR MAGNETIC RESONANCE ^1H, ^{13}C, ^{31}P STUDY OF SUBSTITUTED 2-MERCAPTO-2-THIONO 1, 3,2-DIOXAPHOSPHORINANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 3 Jul 80) pp 711-712

SAMITOV, Yu. Yu., KARATAYEVA, F. Kh. and OVCHINNIKOV, V. V., Kazan' State University imeni Ul'yanov-Lenin

[Abstract] The study of heterocyclic dithiophosphates (I-V) was described. Results indicate the marked conformational mobility of the dioxaphosphorinane system in dependence upon the nature of the substituents in the ring. References: 3.
[94-2791]

UDC 547.241+547.232

0,0-DI(BETA-ETHYL CHLORIDE)-2-NITROVINYLPHOSPHONATE IN REACTIONS OF NUCLEOPHILIC ADDITION AND DIENE SYNTHESIS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 24 Jul 80) pp 712-714

KOSTINA, T. K., BARANOV, G. M. and PEREKALIN, V. V., Leningrad State Pedagogical Institute imeni A. I. Herzen

[Abstract] Reactions of nucleophilic addition of CH-acids to 0,0-di (beta-ethyl chloride)-2-nitrovinylphosphonate and its participation in diene synthesis were discussed. The interaction of 0,0-di(beta-ethyl chloride)-2-nitrovinylphosphonate with the series of active methylene components (malonic, nitroacetic, cyanoacetic ethers and dimedone) in the presence of sodium ethylate led to formation of products of addition (I-IV) with good yields. Reference: 1.
[94-2791]

UDC 535.33.34:539.19

INTRAMOLECULAR INTERACTIONS IN PHOSPHORUS SUBSTITUTED AROMATIC COMPOUNDS BY COMBINATION SCATTERING SPECTROSCOPY

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 8 Jul 80) p 714

RATOVSKIY, G. V., SERGIYENKO, L. M., DMITRIYEV, V. I. and TIMOKHIN, B. V., Institute of Petrochemical Synthesis at Irkutsk University imeni A. A. Zhdanov

[Abstract] A measurement of combination scattering lines I^{00}_{1600} of the series of phosphorus substituted aromatic compounds of n-XC_6H_4Y where X = H, CH_3, F, Cl, CH_3O and Y = PCl_4, $POCl_2$, $(PCl_3)^+$ showed the phosphorus substituents greatly increased the polarity of the electron cloud of aromatic compounds. Reference: 1.
[94-2791]

UDC 547.241

BIS(N,N-DIALKYLAMINO) IODOPHOSPHAZOBENZENES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 3, Mar 81
(submitted 8 Jul 80) pp 717-718

GORBATENKO, Zh. K. and MITEL'MAN, I. Ye., Institute of Organic Chemistry of the UkSSR Academy of Sciences

[Abstract] Synthesis, for the first time, of an iodophosphazo compound by the interaction of bis(N,N-dialkylamino) iodophosphites with phenylazide in an ether solution at 20°C in an argon atmosphere was described and discussed. References: 2.
[94-2791]

UDC 547.241

ELECTRON EFFECT OF PHOSPHORUS-CONTAINING SUBSTITUTES OF THE DIALKYLPHOSPHINE GROUP

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 28 Jul 80) pp 734-737

TSVETKOV, Ye. N., MALAKHOVA, I. G. and KABACHNIK, M. I., Institute of Elementary Organic Compounds, USSR Academy of Sciences, Moscow, Institute of Physiologically Active Substances, USSR Academy of Sciences, Chernogolovka, and Moscow Branch of Magarach All-Union Scientific Research Institute of Viniculture and Winemaking, Moscow

[Abstract] The ionization constants of some m- and n-dialkylphosphinobenzoic acids with gradually increasing volume of alkyl substitutes with the phosphorus atom from the methyl to the tert-butyl substitutes were determined to study the electron effects of dialkylphosphine groups. The Hammett constants and their induction and resonance components were calculated. The dialkylphosphine groups are weak acceptors by the resonance effect. Resonance interaction of phosphorus and the aryl group remains unchanged when volumetric radicals are introduced. The coplanar arrangement of the unshared phosphorus and benzene ring pair may be responsible for the resonance effect in this group of molecules. References 14: 10 Russian, 4 Western.
[95-6521]

UDC 547.26'113

SPLITTING THE P-S BOND IN THIO-DERIVATIVES OF TRIVALENT PHOSPHORIC ACIDS BY DITHIOPHOSPHORIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 22 Jul 80) pp 738-745

OFITSEROV, Ye. N., SINYASHIN, O. G., BATYYEVA, E. S. and PUDOVIK, A. N.,
Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch,
USSR Academy of Sciences

[Abstract] Dithiophosphoric acids react with trialkylphosphites by the Arbuzov reaction scheme with breaking of the alkyl-oxygen bond and formation of dialkylphosphites and esters of dithiophosphoric acids. Reactions of mono-, di- and trithio derivatives of phosphorus with carbonic acids were studied with respect to breaking of the P-S bond and formation of thiol esters of carbonic acids. Ethylphenolthioethylphosphonite reacts reversibly with dithiophosphoric acids and forms mixed anhydrides of phenolethylthiophosphinic and dithiophosphoric acids. It reacts irreversibly up to phenolethylthiophosphinic acids and ethyl alcohols of initial dithiophosphoric acids. The reaction of ethylphenolthioethylphosphonite and thiophosphoric acids yields products with a P-P bond. References 14: 11 Russian, 3 Western.
[95-6521]

UDC 547.341+541.67

INVESTIGATING ORGANOPHOSPHORUS COMPOUNDS BY THE NUCLEAR MAGNETIC RESONANCE METHOD USING LANTHANIDE DISPLACEMENT REAGENTS, THE STEREOCHEMISTRY OF 1,3-ALKADIENEPHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51(113), No 4, Apr 81
(manuscript received 28 Sep 79) pp 745-756

BERKOVA, G. A., VAFINA, G. S., ZAKHAROV, V. I., MASHLYAKOVSKIY, L. N. and
IONIN, B. I., Leningrad Engineering Institute imeni Lensovet

[Abstract] The nuclear magnetic resonance method was used for conformational analysis of organophosphorus compounds. The conformational composition of 1,3-alkadienephosphonates was determined by the effect of substitutes in positions 2 and 3 to the phosphonate group. S-trans-conformation is stabilized with respect to the P-C bond by volumetric or polar substitutes in the cis-position. The S-cis-conformer is stabilized with respect to the C^2-C^3 bond by spatial interaction of the phosphonate group and the substitute in position 3 of the diene system. The conformational composition of 1,3-alkadienephosphonates was calculated and determined quantitatively. Figures 11; references 23: 13 Russian, 10 Western.
[95-6521]

UDC 542.241

INVESTIGATING STRUCTURE OF PHOSPHORUS-CONTAINING α- AND β-NITROALCOHOLS BY THE NUCLEAR MAGNETIC RESONANCE SPECTROSCOPY METHOD

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 24 Jul 80) pp 757-766

BERKOVA, G. A., BARANOV, G. M., ZHIDKOVA, L. A. and PEREKALIN, V. V., Leningrad State Pedagogical Institute imeni A. I. Gertsen

[Abstract] A number of compounds with different alkoxyl groups in composition and different substitutes near the β-carbon atom of nitroalkylphosphonates was investigated by the nuclear magnetic resonance spectroscopy method. Inhibited gauche conformation with transoid orientation of the phosphoryl and nitro group was determined from analysis of the rate constants for 0,0-dialkyl-α-oxy-β-nitroalkylphosphonates. β-nitroalcohols are formed upon nitrification of unsubstituted vinylphosphonates by nitrogen tetraoxide. The corresponding α-nitro derivatives are formed upon nitrification of styrylphosphonate. Figures 7; references 15: 8 Russian, 7 Western.
[95-6521]

UDC 546.183+547.23

REACTIONS OF UNSATURATED COMPOUNDS, ADDITION OF AMINES TO VINYLALLENE PHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 19 May 80) pp 767-775

DANGYAN, Yu. M., PANOSYAN, G. A., VOSKANYAN, M. G. and BADANYAN, Sh. O.

[Abstract] The interaction of vinylallene phosphonates with primary and secondary amines was studied. 1,4-addition products with primary formation of the trans-isomer are formed upon interaction of primary and secondary amines with 0,0-dialkyl-1-vinyl-3-methyl-1,2-butadienyl phosphonates. The addition of primary amines yields compounds in the enamine-imine tautomeric equilibrium state. Equilibrium is shifted toward enamine upon an increase of the electron donor properties of the substitute in the nitrogen atom. Figures 3; references 19: 12 Russian, 7 Western.
[95-6521]

UDC 547.26'118

PHOSPHORYLATED BENZIMIDAZOLES, PHOSPHORYLATED IMIDAZOLES AND BENZIMIDAZOLES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 27 Jul 80) pp 775-778

MATEVOSYAN, G. L., MATYUSHICHEVA, R. M., VODOVATOVA, S. N. and ZAVLIN, P. M.,
Leningrad Agricultural Institute

[Abstract] The possible production of benzimidazoles phosphonemethylated in position 2 was considered to study the effect of structural factors on their biological activity. Imidazoles and benzimidazoles were phosphonemethylated in both positions 1 and 2 upon interaction with benzimidazole-2-aldehyde and alkylphosphytes. The phosphonemethylation reaction of benzimidazole and its derivatives is controlled by the carbonyl component and by the alkalinity of the amine. References 5: 4 Russian, 1 Western.
[95-6521]

UDC 547.241

INTERACTION OF 2-CHLORO-1,3,2-DIOXAPHOSPHOLANS WITH 1,3-DIOXOLANS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 5 May 80) pp 782-786

KRUTSKIY, L. N., SAFIULINA, O. Z., KRUTSKAYA, L. V. and TSIVUNIN, V. S., Kuzbass Polytechnical Institute

[Abstract] The interaction of 2-chloro-1,3,2-dioxaphospholans and 1,3-dioxolans was studied to establish the course of the reactions as a function of the structure of the initial cyclic compounds. The reactions produce either 2(-chloroalkoxy)-2-oxo-1,4,2-dioxaphosphorinans or a mixture of the latter with 2-(-chloroalkoxy)alkyl-2-oxo-1,3,2-dioxaphospholans as a function of the substitutes in the cycles. The reaction products were identified by paramagnetic and nuclear magnetic resonance spectra. Figures 1; references: 7 Russian.
[95-6521]

UDC 546.183+547.241+547.597

PHOSPHORYLATED ADAMANTANS, ADAMANTYL ESTERS OF PHOSPHORIC ACID IN THE ARBUZOV REACTION

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 8 Sep 80) pp 786-789

YURCHENKO, R. I., KLEPA, T. I., BOBROVA, O. B., YURCHENKO, A. G. and PINCHUK, A. M., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] The behavior of tri-1-adamantylphosphite and tri-2-adamantylphosphite in Arbuzoz reaction was investigated to study the reactivity of phosphytes with

volumetric secondary and tertiary alkyl substitutes. Tri-1-adamantyl and tri-2-adamantylphosphites go into Arbuzov reaction with halogenalkyls and yield diadamantylalkylphosphonates. Ethyliodide elimination products form upon reaction of these products with methyliodide. The chlorine atom of the adamantoxyl group is substituted upon reaction of the phosphorus pentachloride on 1-adamantylethylmethylphosphonate. References 4: 2 Russian, 2 Western.
[95-6521]

UDC 547.(241+245):541.49

STRUCTURE AND DONOR ACTIVITY OF ELEMENTARY ORGANIC COMPOUNDS, ROTARY ISOMERISM OF ACYCLIC ORGANOPHOSPHORUS COMPOUNDS CONTAINING R_3SICH=CH GROUPS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81 (manuscript received 29 May 80) pp 799-805

LAPIN, I. A., KOLODYAZHNYY, Yu. V., BUGERENKO, Ye. F. and OSIPOV, O. A., Rostov State University

[Abstract] The spatial structure of compounds of type $Cl_2P(O)CH{=}CHR$ was investigated. The vibrational spectra of the compounds were studied in the liquid and crystalline states and also in solutions to determine features of conformational equilibrium. Infrared and paramagnetic resonance spectroscopy were used to investigate conformation of molecules of the given compounds. The conformational equilibrium is shifted toward S-cis-orientation of the vinyl group with respect to the phosphoryl bond when R_3Si substitutes are introduced to the β-position of the vinyl fragment. Figures 3; references 24: 19 Russian, 5 Western.
[95-6521]

UDC 541.49

STRUCTURE AND DONOR ACTIVITY OF ELEMENTARY ORGANIC COMPOUNDS, INVESTIGATING THE CONFORMATION OF 0,0-DIALKYL-0-TRIMETHYLSILYLPHOSPHATES AND PHOSPHITES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81 (manuscript received 10 Jul 80) pp 806-812

KOLODYAZHNYY, Yu. V., LAPIN, I. A., BUGERENKO, Ye. F. and OSIPOV, O. A., Rostov State University

[Abstract] The existence of conformational equilibrium was investigated by the vibrational spectroscopy method with variation of external conditions for compounds of type $(RO)_2P(X)OSi(CH_3)_3$, where X=0 and R=CH_3, C_3H_5 and C_3H_7. Vibrational spectroscopy, dipole moment and Kerr effect methods were used in investigating the conformation of the phosphate and phosphite compounds in the liquid phase and in solution. Stabilization of the $(CH_3)_3SiO$ grouping in the cis position with respect to group P=X is explained by other than purely steric interaction. Figures 6; references 12: 10 Russian, 2 Western.
[95-6521]

UDC 547.56+535.34/542.91

N^1, N^2-DIMETHYLBENZAMIDINEPHOSPHORATES, THE PROBLEM OF INTERMEDIATES IN PROCESSES OF PHOSPHOROTROPIC MIGRATIONS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 11 Jul 80) pp 956-957

NEGREBETSKIY, V. V., FOGEL'FER, L. Ya., SINITSA, A. D., KRISHTAL', V.S., KAL'CHENKO, V. I. and MARKOVSKIY, L. N., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences and All-Union Scientific Research Institute of Chemical Substances for Plant Protection

[Abstract] Phosphorates that are stable high-melting crystalline compounds in air, difficult to dissolve in polar organic solvents and not subject to temperature variations are formed upon reaction of N^1,N^2-dimethyl-N^1-trimethylsylylbenzamidine with bis-(O-phenylenedioxy)chlorophosphoran and also N^1,N^2-dimethyl-N^1-chlorobenzamidine with phosphorus trichloride. These intermediate phosphorates have a short lifetime in the nuclear magnetic resonance scale. Nucleophilic attack of imine nitrogen on phosphorus in intermediate phosphorans is responsible for phosphorate formation. No phosphorotropic migrations in the phosphorates were determined due to the sterochemically rigid configuration of the tetragonal bipyramid of hexacoordinated phosphorus. References 5: 4 Russian, 1 Western.
[95-6521]

UDC 547.341

SYNTHESIZING PHOSPHORIC N-ALKYL-N-2-PROPYNYLAMIDO ACID CHLORIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 9 Jun 80) pp 957-958

BAYANDINA, Ye. V., SADKOVA, D. N. and NURETDINOV, I. A., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] Phosphoric N-alkyl-N-2-propynylamido acid chlorides were produced upon interaction of phosphorus oxychloride or phosphorus thioxychloride with N-alkyl-N-2-propynylamine in the presence of a base in a diethyl ester medium. The compounds are liquids that can be distilled in a vacuum without decomposition and without shifting of the multiple bond. The structure of the compounds was analyzed by nuclear magnetic resonance and infrared spectroscopy data. The triple bond in the compounds is stable according to paramagnetic resonance spectra. The infrared spectra of solutions of the compounds were studied in CCl_4 to determine the nature of splitting of the absorption bands. References 2: 1 Russian, 1 Western.
[95-6521]

UDC 547.241

REACTION OF RED PHOSPHORUS AND SULPHUR WITH ANISOLE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 9 Oct 80) pp 958-959

MAZITOVA, F. N. and KHAYRULLIN, V. K., Institute of Organic and Physical Chemistry
imeni A. Ye. Arbuzov, Kazan' Branch, USSR Academy of Sciences

[Abstract] The dimer of para-methoxyphenylthionophosphinesulfide was produced by heating a mixture of red phosphorus, sulphur and anisole. The compound is used as a thiinating agent in synthesis of thioketones from ketones and of thioamides of carbonic acids from acid amides. The resulting crystals were filtered of excess anisole and were flushed with toluene to produce 7 grams of the compound.
References: 3 Western.
[95-6521]

UDC 547.341.26.118.07

SYNTHESIZING O,N-DIPHOSPHORYLATED OXYIMINOESTERS AND THEIR PROPERTIES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 7 Jul 80) p 959

SHISHKIN, V. Ye., NO, B. I., YUKHNO, Yu. M. and IVANOVA, L. A., Volgograd Polytechnical Institute

[Abstract] Free oxyiminoesters react easily with the imino group and if there is a surplus of methylphosphonic acid ester chlorides they interact with both functional groups to produce 0-alkyl-ω-(0-alkylmethylphosphonyl)imino-ω-alkoxyalkylmethylphosphonates. Infrared and paramagnetic resonance spectra data, elementary analysis and molecular refraction were used to determine the structure and individuality of the resulting compounds. O,N-diphosphorylated oxyiminoesters have high insecticide activity and are also low-toxic compounds to mammals and man.
References: 1 Russian.
[95-6521]

UDC 547.341

NEW AGENTS FOR DISSOCIATION OF PHOSPHORUS PENTACHLORIDE ADDUCTS WITH ORGANIC COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 14 Aug 80) pp 960-961

KORMACHEV, V. V., MITRASOV, Yu. N., KUKHTIN, V. A., YAKOVLEVA, T. M. and
KURSKIY, Yu. A., Chuvash State University imeni I. N. Ul'yanov

[Abstract] Aldehydes and ketones, paraaldehyde and methylal were used to process intermediate adducts of phosphorus pentachloride with unsaturated compounds and simple esters into alkenyl (2-chloralkyl)phosphonic acid dichlorides. Alkylallyl and alkylvinyl esters, styrene, n-allylanisol, 1-hexene, 1-heptene and phenylacetylene were used as unsaturated compounds. The adducts are broken down rapidly by equimolar quantities of carbonyl compound. Infrared, nuclear magnetic resonance and phosphorus-31 spectra and elementary analysis data were used to determine the structure of the dichloroanhydrides. References: 5 Russian.
[95-6521]

UDC 547.26'118

CYCLIC VINYL ESTERS OF PHOSPHOROUS ACID

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 14 Jul 80) pp 961-962

LUTSENKO, I. F., PROSKURNINA, M. V., KUDRYAVTSEVA, T. N., KARLSTEDT, N. B. and
SHESTAKOVA, T. G., Moscow State University imeni M. V. Lomonosov

[Abstract] The reaction of bis(trimethylsiloxy)alkenes with alkylphosphorus and alkylamidophosphorus acid dichlorides was studied to produce 2-alkoxy- and 2-dialkylamino-1,3,2-dioxaphospholenes. The reaction proceeds in the presence of catalytic quantities of anhydrous zinc chloride and upon heating with distillation of trimethylchlorosilane. The composition and structure of the compounds were determined by nuclear magnetic resonance spectra of phosphorus and hydrogen and by elementary analysis. References: 1 Western.
[95-6521]

UDC 546.185

BIS(DIETHYLAMIDO)FLUOROPHOSPHAZOHYDRIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 29 Jul 80 pp 962-963

KOZLOV, E. S., DUBENKO, L. G. and KUDRYAVTSEV, A. A., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences

[Abstract] Bis(diethylamido)fluorophosphazohydride is produced upon interaction of bis(diethylamido)trichloromethylphosphazohydride with a proportioned quantity of anhydrous hydrogen fluoride. The intermediate product is believed to be phosphoran. Bis(diethylamido)fluorophosphazohydride is a liquid that is distilled in a vacuum. Difluorophosphoran is formed as an impurity to the hydride.
References: 1 Russian.
[95-6521]

UDC 542.97:547.1.118

0,0-DI(POLYFLUOROALKYL)TRICHLOROMETHYLPHOSPHONATES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian Vol 51 (113), No 4, Apr 81
(manuscript received 8 Sep 80) pp 963-964

MAKAROV, A. M. and GABOV, N. I., Perm' State University imeni A. M. Gor'kiy, Institute of Natural Sciences

[Abstract] Complete polyfluoroalkyl esters of trichloromethylphosphonic acid were produced by phosphorylation of polyfluoroalkanols by the complex $(Cl_3CPCl_3)^+(AlCl_4)^-$. $(Cl_3CPCl_3)^+(AlCl_4)^-$ is an effective phosphorylating agent as well as an effective catalyst. The resulting esters were 0,0-di(1,1,3-trihydroperfluoropropyl)trichloromethylphosphonate, 0,0-di(1,1,5-trihydroperfluoroamyl)trichloromethylphosphonate and 0,0-di(1,1,7-trihydroperfluoroheptyl)trichloromethylphosphonate. The structure of the compound was determined by paramagnetic resonance spectra.
References 3: 1 Russian, 2 Western.
[95-6521]

UDC 546.284

CHEMICAL COMPOSITION OF CHROMIUM-PHOSPHORUS-CONTAINING SILICA SYNTHESIZED BY THE MOLECULAR DEPOSITION METHOD

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 25 Oct 79) pp 2633-2636

MALYGIN, A. A., KOL'TSOV, S. I. and ALESKOVSKIY, V. B., Leningrad Technological Institute imeni Lensovet

[Abstract] The chemical composition of products of sequential treatment of a chromium-phosphorus specimen with CrO_2Cl_2, H_2O and PCl_3 vapors was studied. A two-component chromium-phosphorus-containing layer was grown on the surface of the silica. The CrO_2Cl_2 interacts with the OH surface groups and phosphorus is reduced by oxidation-reduction reaction of PCl_3 with chromium-containing groups and as a result of reacting with the hydroxyls on the surface. References: 9 Russian.
[42-6521]

UDC 547.241

REACTIVITY OF HYPOPHOSPHITES INTERACTION OF HYPOPHOSPHORIC ACID AND ITS SALTS WITH ACETOPHENONE DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 14 May 80) pp 2650-2663

YUDELEVICH, V. I., FETTER, A. P., SOKOLOV, L. B., IONIN, B. I. and LIFSHITS, M. I., All-Union Scientific Research Technological Institute of Antibiotics and Enzymes of Medical Designation of the Leningrad Technological Institute imeni Lensovet

[Abstract] The interaction of hypophosphoric acid and its aryl ammonium and inorganic salts with n-aminoacetophenone, n-oxyacetophenone, N-(n-bromobenzylidene)-n-acetylanylene, sulphuric acid and hydrochloric acid n-aminoacetophenones was studied. The reaction of hypophosphoric acid with acetophenone was reproduced. The interaction of hypophosphoric acid and n-aminoacetophenone occurs in the first stage by the α-oxyalkylation scheme by formation of 1-(4-aminophenyl)-1-oxyethanolphosphoric acid. The second stage of the reaction is dehydration, as a result of which 1-(4-amenylphenyl) ethenephosphonic acid is formed. This transformation is a special case in reactions of hypophosphoric acid and its salts with acetophenone derivatives. Figures 4; references 14: 9 Russian, 5 Western.
[42-6521]

UDC 547.341

CAUSES OF REDUCTION PRODUCT FORMATION IN PHOSPHORYLATION OF VINYLALKYL ESTERS BY PHOSPHORUS PENTACHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 13 Jul 80) pp 2663-2671

RYBKINA, V. V., ROZINOV, V. G., GLUKHIKH, V. I. and KALABINA, A. V., Irkutsk State University imeni A. A. Zhdanov and Institute of Petrochemical and Carbon Chemical Synthesis

[Abstract] The reasons for formation of reduction products in phosphorylation of vinylalkyl esters by phosphorus pentachloride were established. The structure of the primary production of the reaction, organylchlorylphosphoniumhexachlorophosphates, was studied. The primary products of the reaction of phosphorus pentachloride with vinylalkyl esters are organophosphorus compounds. The hydrogen chloride is not reduced by the double bond of 2-alcoxy-1-trichlorophosphonium ethenehexachlorophosphate. Formation of reduction products is the result of hydrochlorination of the double bond of alcoxyvinylphosphonate. Figures 6; references 11: 10 Russian, 1 Western.
[42-6521]

UDC 547.241

BIS(DIETHYLAMIDO)TRICHLORYLPHOSPHOAZOHYDRIDE AND ITS DERIVATIVES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 12 Jul 80) pp 2672-2675

KOZLOV, E. S., DUBENKO, L. G. and MARCHENKO, A. P., Institute of Organic Chamistry, Ukrainian SSR Academy of Sciences

[Abstract] Phosphoazohydrides containing dialkylamide and trichloromethyl groups in the molecule were produced to determine whether these hydrides manifest specific properties related to the presence of groups different in electron nature in the molecule. Bis(diethylamido)trichlorylmethylchlorophosphoniumchloride is formed upon interaction of trichlorylmethyltetrachlorophosphorane and diethylamine or diethylamidotrimethylcylane. The bis(diethylamido)trichlorylmethylchlorophosphoniumchloride reacts with ammonia, yielding bis(diethylamido)trichlorylmethylphosphoazohydride. The trichlorylmethyl group is split upon hydrolysis of the bis(diethylamido)trichlorylmethylphosphoazohydride. The ease of the splitting is related to the electron-donor action of the amide groups and is a specific property of the produced hydride. References 4: 3 Russian, 1 Western.
[42-6521]

UDC 547.241

SYNTHESIZING ALKYLTHIOPHOSPHONIC ACIDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 13 Feb 80) pp 2676-2680

NIFANT'YEV, E. Ye., MAGDEYEVA, R. K., SHCHEPET'YEVA, N. P. and MASTRYUKOVA, T. A., Moscow State Pedagogical Institute imeni V. I. Lenin

[Abstract] Reduction of sulphur to alkylphosphonic acids, which react readily with sulphur only in a melt at 120-130°C, was investigated. Thiophosphonic acids were synthesized for the first time by silylation of alkylphosphonic acids with subsequent sulphurization and hydrolysis of the intermediate products. The thionic structure of the thiophosphonic acids and their derivatives is shown. Figures 1; references 7: 6 Russian, 1 Western.
[42-6521]

UDC 547.414.1:547.241

STEREOCHEMISTRY OF 1-OXO-1-ALKOXY(HYDROXY)-3,4-DIMETHYL-3,4-DINITROPHOSPHOLANES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 15 Apr 80) pp 2680-2690

BERESTOVITSKAYA, V. M., YEFREMOV, D. A., BERKOVA, G. A., PEREKALIN, V. V. and ZAKHAROV, V. I., Leningrad State Pedagogical Institute imeni A. I. Gertsen

[Abstract] The three-dimensional structure of 1-oxo-1-alkoxy(hydroxy)-3,4-dimethyl-3,4-dinitrophospholanes was studied. A group of 1-oxo-1-alkoxy(hydroxy)-3,4-dinitrophospholanes not previously represented in the series was produced by nitration of 1-oxo-1-alkoxy(hydroxy)-3-phospholenes with nitrogen tetroxide. The three-dimensional structure of the resulting compounds was studied by nuclear magnetic resonance and paramagnetic resonance methods using lanthanide shift reagents and also by vibrational spectroscopy. The 1-oxo-1-alkoxy(hydroxy)-3,4-dimethyl-3,4-dinitrophospholanes are conformationally homogeneous. Their stereochemical structure corresponds to the shape of a semichair with transoid arrangement of transoid substitutes. Figures 7; references 27: 18 Russian, 9 Western.
[42-6521]

UDC 541.6:547.1.118

IONIZATION POTENTIALS AND INTRAMOLECULAR CHARGE TRANSFER

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 22 Mar 80) pp 2690-2697

ZVEREV, V. V., YERMOLAEVA, L. V. and VILLEM, Ya. Ya., Institute of Organic and Physical Chemistry imeni A. Ye. Arbuzov, Kazan' Branch of Academy of Sciences and Tartu State University

[Abstract] The photoelectron spectra of dichloroanhydride of chloromethylphosphonic acid and methyl(chloromethyl)sulfide were investigated. The shifts of ionization potentials of unshared chlorine pairs in chloromethyl compounds characterize the value and direction of the intramolecular charge transfer. The ionization potentials of unshared chlorine pairs of methyl(chloromethyl)sulfide and dichloroanhydride of chloromethylphosphonic acid are found at opposite ends of the variation interval of this value. The values of the ionization potentials of unshared chlorine pairs and the nuclear quadrupole resonance frequency of a number of chloromethyl compounds form a linear dependence. Data for compounds with an extreme value of n-sigma*(C-Cl) interaction comprise an individual series. Figures 5; references 22: 14 Russian, 8 Western.
[42-6521]

UDC 547.569-547.436

REACTION PRODUCTS OF 2-OXY-5-TRET-ALKYLTHIOPHENOLS WITH PHOSPHORUS TRICHLORIDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 31 Jan 80) pp 2698-2700

MIRZA, M. Z., ALIYEV, Sh. R. and MAMEDOV, F. N.

[Abstract] The reaction of 2-oxy-5-tret-alkylthiophenol with phosphorus trichloride was studied. Formation of 2-chloro-5-tret-alkylbenzo-1-oxo-3-thia-2-phospholan proceeds through stages of 2-(2'-oxy-5'-tret-alkylphenylthio)-5-tret-alkylbenzo-1-oxa-3-thia-2-phospholan and 2-[(2'-oxa-5'tret-alkylphenylthio)]-bis-(5-tret-alkylbenzo-1-oxa-3-thia-2-phospholan). References: 3 Russian.
[42-6521]

UDC 547.26'118

REACTIONS OF PHOSPHORUS-CONTAINING TRI- AND TETRASULFIDES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 24 Mar 80) pp 2700-2703

KHASKIN, B. A., TOLMACHEVA, N. A. and PROMONENKOV, V. K., All-Union Scientific Research Institute of Chemical Plant Protection

[Abstract] The reaction of phosphorus-containing tri- and tetrasulfides with secondary aliphatic and heterocyclic amines was studied and these reactions proceed through formation of an unstable ammonium salt which breaks down with transfer of a proton from the nitrogen atom to the phosphorus-containing anion with separation of the corresponding dialkoxyphosphoryl- and dialkoxythiophosphoryl-N-dialkyl amino di- and tri-sulfides and 0,0-dialkylthio- or 0,0-dialkyldithiophosphoric acids. Dialkoxyphosphoryl- and dialkoxythiophosphoryl-N-dialkylaminodisulfides and trisulfides are formed. The reaction proceeds with formation of the corresponding bis-(dialkylamino)mono- and bis-(dialkylamino)disulfides if there is a surplus of amine. References 4: 2 Russian, 2 Western.
[42-6521]

UDC 547.242

POTASSIUM MANGANATE OXIDATION OF DI(n-ETHYLPHENYL)ALKYLARSINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 1 Nov 79) pp 2721-2724

GIGAURI, R. D., GODERDZISHVILI, L. I., KHALIMOV, F. G., CHERNOKAL'SKIY, B. D. and INDZHIYA, M. A., Tbilisi State University and Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Potassium manganate oxidation of di(n-ethylphenyl)alkylarsines was carried out and the reactivity of the compounds was investigated. Oxides of di(n-carboxyphenyl)alkylarsines are formed upon potassium manganate oxidation of di(n-ethylphenyl)alkylarsines in an aqueous solution with subsequent acidification of the filtrate. The products of sulphur dioxide reduction of oxides of di(n-carboxyphenyl)alkylarsines are di(n-carboxyphenyl)alkylarsines. Disilver salts of di(n-carboxyphenyl)alkylarsines are produced upon interaction of di(n-carboxyphenyl)alkylarsines and silver nitrate. Figure 1; references 13: 11 Russian, 2 Western.
[42-6521]

UDC 547.118'26

INTERACTION OF SILYLDITHIOPHOSPHATES WITH SOME PHOSPHORUS-CONTAINING CARBONYL COMPOUNDS

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 9 Jul 80) pp 2738-2745

KUTYREV, G. A., KUTYREV, A. A., CHERKASOV, R. A. and PUDOVIK, A. N., Kazan' State University imeni V. I. Ul'yanov-Lenin

[Abstract] The interaction of silyldithiophosphates with some phosphorus-containing carbonyl compounds was investigated. Interaction of silyldithiophosphates with acylphosphonates and phospholated acetic aldehyde leads to formation of reduction products in the carbonyl group. Silylated ketophosphonate and the corresponding S-alkyl ester of dithio acid were produced in reactions with β-ketophosphonates, which proceed with participation of a phosphoryl fragment. Silyldithiophosphonates react in similar fashion with phosphonates and phosphites. Figures 1; references 12: 7 Russian, 5 Western.
[42-6521]

UDC 547.26'11

DIRECT SUBSTITUTION OF THE NITROGROUP FOR THE PHOSPHORYL GROUP IN 5(6)-NITROBENZIMIDAZOLE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 23 Jun 80) p 2803

MATEVOSYAN, G. L., VODOVATOVA, S. N. and ZAVLIN, P. M., Leningrad Agricultural Institute and Leningrad Institute of Movie Engineers

[Abstract] Direct substitution of the nitrogroup for the phosphoryl group in 5(6)-nitrobenzimidazole nitrate upon interaction of 5(6)-nitrobenzimidazole nitrate with dipropylphosphide in o-dichlorobenzene was carried out to find effective growth regulators in plants. The structure and individuality of the compound were confirmed by infrared and ultraviolet spectra and by thin-layer chromatography and the composition was established by element analysis.
[42-6521]

UDC 547.241

REVERSIBLE ISOMERIZATION OF MONOOXIDIZED ALKYLTRIALKOXYDIPHOSPHINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 9 Jun 80) pp 2803-2805

POSS, V. L., KUDINOVA, V. V. and LUTSENKO, I. F., Moscow State University
imeni M. V. Lomonosov

[Abstract] Reversible isomerization in a number of monooxidized asymmetrical diphosphines containing R and OR groups is described for the first time. The reversibility of isomerization is caused by the electron effect of the substitutes or rather by the acceptor nature of the OR groups. The acceptors are retained in three-coordination phosphorus in the monooxide, which reduces the relative thermodynamic stability of these compounds. The isomer anhydrides are similar in stability to monooxides, despite the presence of a phosphoryl group in the monooxides. References 8 Russian.
[42-6521]

UDC 547.26'118

AMIDOPHOSPHATES WITH ACETAL FUNCTION IN THE AMIDO GROUP

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 1 Jul 80) pp 2805-2806

MOSKVA, V. V., PAVLOV, V. A., ZYKOVA, T. V. and RAZUMOV, A. I., Kazan' Chemical and Technological Institute imeni S. M. Kirov

[Abstract] Phosphorylated amidoacetals were synthesized by interaction of monochlorophosphates with aminoacetal and aminodiacetal in the presence of triethylamine as a hydrogen chloride acceptor. The structure of the products was confirmed by infrared data and paramagnetic resonance spectra.
[42-6521]

UDC 547.56+535.34;542.91

PHOSPHOROTROPY IN N^1-DIETHOXYPHOSPHORYL- AND N^1-DIETHOXY-N-PHENYLAMINOPHOSPHORYL-N^1,N^2-DIMETHYLBENZAMIDINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 26 Jun 80) pp 2806-2807

NEGREBETSKIY, V. V., BOGEL'FER, L. Ya., SINITSA, A. D., KRISHTAL', V. S., KAL'CHENKO, V. I. and MARKOVSKIY, L. N., Institute of Organic Chemistry, Ukrainian SSR Academy of Sciences, and All-Union Scientific Research Institute of Chemical Plant Protection

[Abstract] Rapid reversible intramolecular phosphorotropic migrations of phosphoryl and iminophosphoryl groupings were realized in amidines by paramagnetic resonance spectroscopy. The high mobility of the phosphoryl group in the system is explained by the significant nucleophilicity of the imine nitrogen which attacks the phosphorus and by the possibility of permutational migrations in trigonal bipiramide of the intermediate. References 6: 5 Russian, 1 Western.
[42-6521]

UDC 547.341

NITRIZATION OF β-DIISOPROPOXYPHOSPHONYLPROPRIONIC ALDEHYDE

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 4 Jul 80) pp 2810-2811

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[Abstract] Nitrization of β-diisopropoxyphosphonylproprionic aldehyde proceeds to the β-position to the carbonyl group due to the high activating effect of the carbonyl group and combination of it with the C = N bond in the final product. Nitrozation of β-diisopropoxyphosphonylproprionic aldehyde produces a low yield of only amylnitrate in the acid medium. Nuclear magnetic resonance and paramagnetic resonance spectra indicate that β-diisopropoxyphosphonyl-α-oxyminoproprionic aldehyde exists in the same syn-form with the intramolecular H-bond having a formyl group. References: 1 Russian.
[42-6521]

UDC 547.558.1

INTERACTION OF GRIGNARD REAGENTS WITH 10-CHLORO-10-THIONO-5,10-DIHYDROPHENOPHOSPHAZINES

Leningrad ZHURNAL OBSHCHEY KHIMII in Russian No 12, Dec 80
(manuscript received 1 Jul 80) pp 2809-2810

DEMIDOVA, N. I., BOKANOV, A. I., and STEPANOV, B. I., Moscow Chemical and Technological Institute imeni D. I. Mendeleyev

[Abstract] 5-methyl-10-chloro-10-thiono-5,10-dihydrophenophosphazine reacts with phenylmagnesium bromide to form 5-methyl-10-phenyl-10-thiono-5,10-dihydrophenophosphazine and it reacts with methylmagnesium iodide to form a mixture of 5,10-dimethyl-10-thiono-5,10-dihydrophenophosphazine and bis(5-methyl-10-thiono-5,10-dihydrophenophosphazinile-10). Data of element analysis of the compounds correspond to the given formulas. References 3: 2 Russian, 1 Western.
[42-6521]

UDC 542.91:547.1'118

SOME DERIVATIVES OF ETHYLENEDIAMINOBISMETHYLPHOSPHONIC ACID

Moscow IZVESTIYA AKADEMII NUAK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 81
(submitted 28 May 80) pp 646-650

MEDVED', T. Ya., GORYUNOVA, I. B., BEL'SKIY, F. I. and KABACHNIK, M. I., USSR Academy of Sciences Institute of Elemental Organic Compounds imeni A. N. Nesmeyanov, Moscow

[Abstract] One possible means of synthesis and study of new organophosphonic reagents containing fragments simultaneously characteristic of a complexone and an extrahent was described and discussed. The method of potentiometric titration for N, N'-di-(beta-diphenylphosphorylethyl) ethylenediaminobismethylphosphonic acid was used to find the pKa of acid dissociation and the complex formation with some cations in water was studied. It was assumed that phosphinic acid substitutes in the nitrogen atoms do not participate in coordination with the metals of the ions. The experimental procedure was presented in detail. References: 13; Figures: 3.
[98-2791]

UDC 542.91:547.1'118:547.594.3

INTERACTION OF PHENYLDICHLOROPHOSPHINE AND CYCLOHEXANONE

Moscow IZVESTIYA AKADEMII NUAK SSSR: SERIYA KHIMICHESKAYA in Russian No 3, Mar 81 (submitted 4 Sep 80) pp 697-698

KARDANOV, N. A., PROVOTOROVA, N. P., GODOVIKOV, N. N. and KABACHNIK, M. I., USSR Academy of Sciences Institute of Elemental Organic Compounds imeni A. N. Nesmeyanov, Moscow

[Abstract] A new course of the reaction between P(III) chloride and ketone was discussed. Interaction of cyclohexane and phenyldichlorophosphine at 10-15° formed cyclohexylidene-cyclohexanone (III) and acid chloride of phenyl-alpha-hydroxy-cyclohexyl phosphinic acid (IV). At ratios of ketone $PhPCl_2 = 3:1$ and more, the yields of (III) and (IV) reached 70 and 80 percent respectively. Perhaps, phenylchlorophosphine, causing condensation of 2 molecules of cyclohexanone is converted into phenylchlorophosphonite PHPH(O)Cl which is joined to the 3d molecule of cyclohexane with formation of (IV). References: 6.
[98-2791]

UDC 546.18

DIASADIPHOSPHETIDINES

Moscow USPEKHI KHIMII in Russian Vol 50, No 4, Apr 81 pp 606-631

GRAPOV, A. F., RAZVODOVSKAYA, L. V. and MEL'NIKOV, N. N., All-Union Scientific Research Institute of Chemical Substances for Plant Protection, Moscow

[Abstract] The literature for the period 1969 through the first half of 1978 was surveyed with respect to synthesis and determination of the chemical properties of four-membered cycles containing alternating nitrogen and phosphorus atoms of different degree of coordination. Synthesis of diasadiphosphetidines with trivalent phosphorus, tetracoordinated and pentacoordinated phosphorus atoms was investigated. Various physicochemical methods, including x-ray diffraction analysis, were used to study the structure of the diasadiphosphetidine ring. Diasaphosphenic and diasaphosphonic phosphetidines were produced from 2-chloro-4-methyl-1,3,2,4-diasadiphosphetidine with ammonium chloride. References 108: 18 Russian, 90 Western.
[96-6521]

CSO: 1841

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